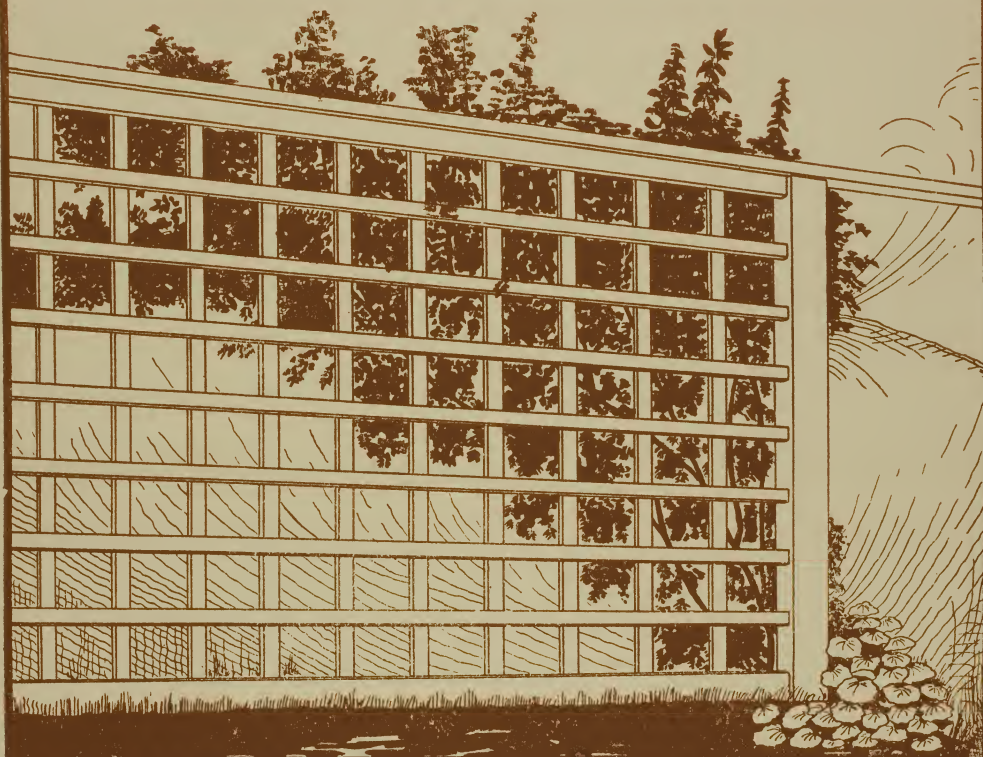


# California Garden



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Our Boys and Girls Page

MARCH, 1922

TEN CENTS



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# The California Garden

Published Monthly by the San Diego Floral Association  
One Dollar per Year, Ten Cents per Copy

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POINT LOMA, CALIFORNIA, MAR, 1922

No. 9

## Work for a Restless World

From a myriad of suggestions as to the cause of the present industrial depression which have reached the President's Conference on Unemployment in Washington, there stand out a few shining sentences from Commander Evangeline Booth, head of the Salvation Army. They deal with idleness and its cure, and run in this wise:

"For unemployment, for hard times, man alone is to blame.

"The trouble with the world is traceable to nothing more or less than man's inhumanity to man. The crops grow just the same, the rains fall, the needed snows come, the mines give up their ore, and the cattle dot our hills—just as of old. Never has God or nature ceased to bestow the blessings that come from the earth.

"But in the sight of all these blessings men have elected to differ—to differ unreasonably. Angry debate starts, and soon the

world is in a foment. Trade halts, production stops. Entire nations go into a deadlock on the trade basis. Manufacturer, merchant and public view each other with suspicion, and the evil circle is complete. Millions become idle, many grow hungry—the whole world suffers.

"It is in this state we find ourselves today; analyze the cause honestly, and you can come to only one conclusion. Negative mental processes, purely man-made antagonisms, lie at the root of the evil.

"Honest differences of opinion can be settled without disturbing the machinery of progress. Differences due to unreasonableness never can be lead to anything but disruption.

"Let us come to understand each other better; let us in the light of honest reason practice teamwork, which is the life-giving grease on the world's axis—then unemployment and hard times will be no more."

## WATERING FERNS

Although Ferns like a more humid atmosphere than most plants, it is a great mistake to suppose that they require such copious supplies of water at the roots as many seem to consider necessary. With all pot plants, watering is one of the most important factors in producing healthy and luxuriant growth, and with Ferns it is very necessary to give water judiciously, especially to the more delicate sorts. I believe that many of our choicest Ferns are lost through excess of moisture at the root, and the ordinary sorts, more particularly *Adiantums*, are weakened from the same cause. Plants which have been kept fairly dry at the root during the winter will, now as the weather gets brighter, start away freely and throw up strong, healthy fronds, while those which have been saturated with water will produce weak and sickly growths. When once they get into this condition it takes a long time to set them right. It would be useless to say how often Ferns should be watered, as much depends upon circumstances, some sorts requiring much more water than others. The *Gymnogrammas*, for instance, require more moisture from the soil than others with more foliage. *G. schizophylla*

*gloriosa* will soon shrivel up if neglected, while *Adiantums* under the same conditions will not suffer in the least. Much depends upon the artificial heat given. Where the plants are near the pipes they will require almost as much water during the winter as in summer, and unless carefully examined they are more likely to suffer from the opposite extreme, for the surface may appear moist, while at the bottom of the pots the soil may be quite dry.

Some Ferns when in a warm temperature will continue to make new fronds throughout the winter, while others mature their fronds in the autumn, and do not make new ones until the spring. Those which are growing will take more water than those at rest. Most of the *Adiantums* are at rest during the winter unless they are kept too warm, in which case the plants become weakened. It is much better to keep a low temperature and the plants rather dry during the winter, then they will start away vigorously. The temperature may be raised as the days lengthen, water being given freely while the plants are growing. Ferns which lose all their fronds dur-

*Continued on page 6*

## Oak Fungus Disease, Oak Root Fungus Disease, Armillaria Root Rot, Toadstool Root Rot, Mushroom Root Rot, Etc.

One of the most widespread and injurious fungi in the Pacific Coast region is that known as oak root fungus or *Armillaria mellea*, (formerly known as *Agarius melleus* and recently called *Armillaria putrida*). This fungus is one which infects various kinds of roots or wood lying in the soil, causing wood rot. It attacks living trees or shrubs and causes their death. Affected trees or shrubs usually show a certain amount of distress before they suddenly collapse and die during dry weather. Sometimes a tree dies suddenly, without previous symptoms and sometimes an attacked tree lingers along making a certain amount of recovery but finally succumbs. From the behavior of individual trees it might not be possible to distinguish between this trouble and certain others, such as gopher injury, root sour sap, etc.

In orchards the fungus usually develops from a center, spreading outward from one tree to another year after year, so that in time extensive areas become killed out. Trees replanted within the affected area ordinarily die within a few years. This behavior is highly characteristic but some instances have been found where local water injury gives rise to a similar result. Trees affected with oak fungus, when examined at the root, show characteristic symptoms.

**Rhizomorphs** are dark purplish brown, cord-like bodies which grow out from the rotted wood which is filled with the fungus. They may grow for several yards through loose soil, but the length is usually limited, especially in firm soil. They resemble roots but are smooth and shiny and branch in a different manner. If a rhizomorph is twisted in the fingers it is found to be composed of an outer, brittle shell and a light colored tow-like center, whereas a true root has a woody core. A rhizomorph is really a bundle of fungus threads, the outer layer of which has become hardened into a shell. When the tip of the growing rhizomorph (which is white) comes in contact with a susceptible root the microscopic threads of the rhizomorph penetrate the surface and spread out below into white fan-shaped mycelium which causes the rapid death of the invaded part of the bark. If conditions are not favorable for their development, rhizomorphs may not be formed, so that they are not always present. In the rainy coast district they may grow out long distances from tan oak or other affected roots and attack fruit trees at the crown, causing their death if not treated in time.

**Surface of affected roots** may not be noticeably different from normal but rhizomorphs are usually present. These, however, may be on the surface without penetrating the

bark and so may be found on healthy roots, coming from some affected root at a distance. Usually there is some exudation of gum and this is often copious. The surface which has been most below ground often has dainty plume like brown tufts about  $\frac{1}{8}$  inch tall. Think bark, as on citrus roots, is usually puffed and roughened. It is often cracked in long lines with the fungus crowded out into the cracks as black ridges. Sometimes a specimen is found in such active growth that the white plaques of the fungus show through the cracks.

**White fan-shaped mycelium.** When a root attacked by oak fungus disease is examined by cutting into the bark, the whole substance is found invaded by white or creamy mycelium in the form of large, conspicuous plaques and the normal consistency is entirely changed being first watery and then soft and decaying. There is often associated within this a gelatinous or gummy material, and in many of the affected trees the margin of the invaded bark gums copiously. The odor of this decayed bark is not sour or putrid but has a sharp, rather agreeable, mushroom smell. This white mycelium is an invariable sign of the disease. Where a tree is killed by some other agent, different kinds of white fungi may invade the bark and form felty mycelium so that sometimes considerable skill is required to recognize the *Armillaria* mycelium with certainty. The white mycelium of *Armillaria* is never found in nature on the surface of the bark but always buried, since if the living mycelium comes in contact with the air its surface soon turns brown.

**Wood decay.** The white mycelium also penetrates into the sound wood, but here the plaques are broken up into a diffuse mycelium visible only where the rot becomes advanced. At the outer limits of penetration the wood is slightly darker than normal, but the fungus rapidly causes the wood to become decayed with a uniform white rotting. Rapidly decaying wood or bark, when exposed in the dark, shows phosphorescence. Unlike other wood rotting fungi, *armillaria* mycelium is killed by thorough drying out, so that infected roots or stumps left on the surface of the ground or in the wood pile during summer become harmless.

**Sporophores.** The spores of the oak root fungus or *Armillaria* are produced on toadstools or mushrooms, which come in large clusters from fungus invaded wood. They have not been found in California except in the period from October to February. The toadstools are light tan color on the top with tiny brown scales, varying considerably ac-

*Continued on page 4*



## Notes From English Gardens

80 Osborne Road, West Hartlepool, England.

February 14, 1922.

To the readers of "California Garden:"

As I sit down to write you a few lines, I am wondering what sort of weather you are having in San Diego, as we are paying the penalty of having such a glorious summer last year. For the past fortnight everything here has been completely frozen up. It has never been known to be so keen before. The frost has even searched into our greenhouses, and killed scores of chrysants and geraniums. However, I suppose we must not grumble we had an ideal summer last year in spite of the drought. Flowers seemed to come in such profusion and lasted so well. Our seed growers however, have warned us that on account of the great heat lots of seed are very hard and will take a lot of germinating. This applies particularly to sweet peas, and we are therefore "chipping" the skins of all black seeded ones, in order to make germination easier. Roses were very fine too with us, but the cream of all the year was the early flowering chrysants. They were simply masses of bloom and in many of the gardens tons of blooms were wasted because gardeners could not give them away fast enough. I have often wondered if they would suit your climate, because they come at a time when the summer flowers are nearly over and the indoor ones are not ready. I had a delightful holiday down in the south of England 300 miles from home, and saw some beautiful gardens at several places.

The Dahlias at the Isle of Wight were particularly fine. Some day in the near future I would like to write you a description of my tour. I see, according to the Los Angeles Times, San Diego has fully maintained her reputation during 1921. I don't wonder at that at all. From what I can gather from the "Garden" everybody seems to be doing his and her level best to help in one direction, and I can only say "may the good work go on and prosper". You have an efficient staff to help you in your garden troubles, if you will only practice what they preach success will be yours. I was very glad to see the little snapshots in the January number of the "Garden". They help to liven the pages up a great deal and make the reading matter more interesting. Hoping you will all do your best (or have done) for the Bulb Show.

Sincerely yours,

W. C. King.

### JONQUILS

I stood by the side of the jonquil bed

In the cool of the dewy morn,  
And the buds made me think of baby souls  
When first on earth they're born.

The baby souls expand and grow,

In the warmth of a mother's love,  
And the buds will open up their bloom  
From the warmth of the sun above.

—Varuna Hartmann,

In Southern Florist.

## NATIVE BIRDS DESTROY NOXIOUS INSECTS

Bronte A. Reynolds

Editor California Department of Agriculture

Hundreds of timely pages have been written on the subject of birds as insects destroyers and we are fast coming to understand that the annual toll of fruit and berries contributing in season to a small part of bird dietary is small compensation when weighed against the vast good resulting from the destruction of insects that for the most part take many times greater annual toll from our fields and orchards.

On the 22d of February the author in company with Entomologist Thompson of the Federal Department of Agriculture visited the great pasture region lying over against the Consumnes River in the Sacramento Valley. En route the entire way the roadside was riotous with the farmers feathered allies; robins, larks, bluebirds, flickers, field sparrows, grackles, owls and many others whose identity is unknown to the writer. Reaching our destination, the entomologist pointed out on the rolling pasture land vast areas of a subdued coloring in sharp contrast to the rejuvenated green of the grassland. "Those patches are the work of the larvae of crane-flies." Closer examination of the infested areas revealed thousands of pitted depressions in the soft earth denuded of grass. "Those marks show where the birds have been picking out the worms!"

The author was informed that last year, analysis of the stomach contents of nearly every variety of bird collected in the vicinity, showed them to be fairly gorged with, not only the crane-fly worm stage but also fragments of other insects that work great damage to farm and orchard.

It is still in the memory of people living in Oregon and Washington how the great flocks of an aquatic bird, they called the "rail" famed for its insectivorous habits, visited their region. Today that bird is extinct! I firmly believe that without our native birds, the farmer could not compete with the vast hordes of insect life, whose name is legion. Let everyone endorse and support all measures for the protection of our feathered friends.

### A CENTURY-OLD ROSE TREE

I took a photograph some time ago in a friend's garden near Bath, of an ancient Rose tree—so old that no one remembered who had planted it. Probably it had been flourishing for over a century. It had a diameter of 15 feet and was supported by iron uprights. The tree is now dead, and the owner having since sold the property, I do not feel justified in publishing the name of the garden. The Rose was a pale yellow with a golden centre (very pretty in the bud). Nobody could even name it.

(Miss) I. Chester, Chideock, Bridport.

From Popular Gardening, London, England.



## OAK ROOT FUNGUS

*Continued from page 2*

cording to the dryness of the atmosphere. The lower surface (gills) of the toadstool is white or dull white and produces spores which often appear below the toadstool as a white powder spread over the ground. On the stalk below the top or cap of the toadstool is a delicate ring. The spores which make up the powder beneath the toadstools are capable of growing and reproducing the fungus, but apparently there is no danger from these spores attacking living plants directly. They probably become established in rotting stumps or similar situations, so that ordinarily there will be no particular advantage in attempting to destroy the toadstools. When young and tender these toadstools or mushrooms are edible, although bitter before cooking, and are said to be fairly good in quality. When old they usually become filled with larvae of certain fungus gnats and under the influence of these maggots melt down to a wet brown mass.

**Susceptible plants.** Nearly all trees and shrubs may be attacked. The Armillaria, however, is a rather slow acting fungus so that annual or short lived crops are not usually seriously injured; also plants with fine, slender roots are not much affected owing to the habit of the fungus of developing in roots of some thickness. It has been reported as attacking rhubarb and sometimes the rhizomorphs penetrate potatoes causing rot, but ordinarily in California such plants are not injured. A few trees have seemed to be highly resistant and some practically immune. French pear is perhaps immune while the trees are growing healthily. Ussuriensis pear is probably resistant also but common Japanese pear appears more susceptible. Black walnut and figs are considered highly resistant. Royal hybrid is an excellent root and is reliably reported to be more resistant than native black but is one of the most difficult walnut stocks to secure. Apples are certainly more resistant than stone fruits, and Myrobalan plum is apparently somewhat more resistant than peach, almond or citrus.

### CONTROL

**Treatment of affected plants** may be successful if the soil is removed from the roots and the diseased parts removed, treating the wounds as in other cases of tree surgery with some disinfectant such as creosote, Bordeaux paste or corrosive sublimate (1-1000), followed with asphalt. Usually the disease is not discovered until it is too late to save the tree. In California, except in the north coast region, the fungus generally works so deeply that the lower roots are mostly destroyed before the upper part of the root system is affected. Where the rhizomorphs come through the loose surface soil from a neighboring stump it may be entirely practical to remove them from the crown of the tree and scrape off the infection in the outer bark, provided the work is done in time. Evidently

ly the fungus does not in any way poison the part of the tree which is not invaded and it becomes merely a question of saving sufficient roots to support the tree.

**Preventing the spread of the fungus** may be accomplished by several means. It has been sometimes recommended to pull out or dig out two rows of trees surrounding the margin of the spot, and this has been reported to be successful in a number of cases, however, the sacrifice is often great. The infected soil may be separated from the uninfected about it by means of a ditch. Where shallow rooted trees like citrus are involved this is probably entirely practicable, especially in the shallower soils. It is doubtful whether it will be feasible to make a ditch more than about four feet in depth so that for very deeply rooted trees in deep soils the ditch may not be completely effective but it is promising.

The greatest pains should be taken to examine all roots removed in the digging and if any are found affected with Armillaria, the location of the ditch must be changed so that those may be included, that is, the ditch must be entirely outside the affected area. The cost in high priced orchards is not believed to be prohibitive. However, once opening the ditch will not be sufficient since it will be rarely found satisfactory to leave the ditch open during the summer, and the digging would need to be repeated, probably about every two years. This comes about because new roots will cross the ditch, mingle with

*Continued on page 10*

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# The March & April Gardens

## THE FLOWER GARDEN

By Mary A. Matthews.

In these two months most anything you way desire can be planted in your garden. Many seeds can be sown right in their permanent location out of doors, tho for the more choice kinds most people prefer to sow them in boxes and then transplant into the open. Many of the summer blooming bulbs will do well if planted now. In your list be sure to include some Tigridias,—they are so very showy; the flowers are fugitive, lasting only a day, but they succeed each other so rapidly and are so gorgeous in their coloring that they will repay the time given to them. Tube roses should be put in now,—they require a warm sunny location, a rich sandy soil and ample water. Gladiolus can be put in from now on and give the most effective results in the garden planted in groups of one kind here and there in the mixed border. They are tho, a true florist's flower, and some glorious ones have been originated lately by the growers who specialize along this line. Personally I prefer the smaller flowered ones. The tendency in flower growing along all lines these days seems to be size, often at the expense of beauty,—I think a notable example is the Dahlia.

Lift your Chrysanthemums and divide now, take off the newly rooted plants around the old stalk and throw the remainder of the plant away. Plant in fresh soil, well manured, given a good soaking, keep free from weeds, loosen the soil round them every few days till growth is well started. The little pompons and the singles are quite popular now as cut flowers. All subtropical shrubs and vines can go in the next few weeks. All planting is late tho this season on account of the unfavorable weather we have had tho we should be thankful that the ground if well tilled will give ample moisture.

Cannas can be subdivided and where well grown will furnish bright spots in the flower garden for a long season. Cosmos can be sown to advantage now and will give a wealth of bloom when flowers are most needed. The hardy asters also come at a season when we most appreciate them. These can be had now in white, blue of all shades, also rosy purple and lavender pink. Along with these are the Boltonias,—very similar in appearance and equally as good for cutting.

Prune all your shrubs that have made an early bloom,—usually all that is required is to cut back to the bloom stalks as soon as the

## THE VEGETABLE GARDEN

By Walter Birch

With the continued rains and cold weather, garden operations have not made much progress since last month, so the programme is still about the same as last advised, namely, keep the weeds down and ground well stirred. The latter is very important, because to prevent ground from packing thereby excluding sun and air, it will be necessary to keep the surface open by constant cultivation.

Practically the whole list of vegetable seeds can now be planted or you can obtain such plants as tomatoes, cabbages, peppers and egg plant, thereby saving six weeks in time.

You will find the following varieties of vegetables among the best, pole beans, Kentucky Wonder, bush Burpees Stringless Green Pod and Ventura Wonder-Wax, lettuce, Los Angeles Market and Iceberg; musk melons, Rocky Ford, Tip Top and Mission Bell; water-melons, Black Seeded Chilian and Klondyke; cucumbers, Davis Perfect and Klondyke; peas, Senator and Yorkshire Hero; sweet-corn, Black Mexican, Golden Bantam and Oregon Evergreen; squash, White Bush Scalloped and Summer Crookneck; spinach, Long Standing. J. B. Wagner the rhpbarb specialist makes great claims for his new Rhubarb the "Panama". It is supposed to bear every month in the year, stalk is larger and heavier than Wagner's Giant Crimson Winter, has less acid, therefore does not require so much sugar, flavor very fine, does not need to be peeled and is a tremendous producer. Two or three roots should be ample for one family.

In the flower garden it is almost Dahlia time again, and these bulbs as well as Cannas, Tuberous Rooted Begonias, Tube Rose, Gloxinias and Gladioli are again in season. You can also plant the greater part of the flower list both annuals and perennials, seeds and plants.

blooms are done. Where a plant suckers at the root these should be removed during the growing season. Thinning out may be done by cutting out dead twigs, weak growth and crowded branches. Keep weeds down, cultivate the soil, watch closely for insect pests and destroy them.



## WATERING FERNS

*Continued from page 1*

ing the winter require careful attention. The soil must be moist enough to keep the roots in good condition, as it is a mistake to dry them up too much. The deciduous Adiantums are among the most difficult Ferns to keep through the winter. I find they do best if placed on a shelf and kept sufficiently moist to prevent the soil from cracking away from the pots. *A. lunulatum*, *A. palmatum*, *A. speciosum*, and *A. Henslowianum* are deciduous, and those who are not acquainted with their habits are apt to throw them away after they have lost their fronds, in the belief that they are dead. *Leucostegia immersa* keeps well in a dry, cool place. The hardier deciduous Ferns are better when moderately moist.

F.

—Gardening Illustrated London, England.

## FEBRUARY MEETING

The regular February meeting was held on the evening of the twenty-first at the hospitable home of Mr. and Mrs. Blochman, the president, Mr. Gorton, in the chair. Owing to the absence of Miss Matthews the secretary the reading of the minutes was omitted. Mr. Gorton reported that the subscriptions to the El Monte oaks proposition were coming in very encouragingly. The subject of the evening was Seasonal Planting. An able paper on the subject was prepared by Mr. Morley and read by Mr. Gorton. The paper was considered so valuable that it is published elsewhere in this magazine. A pleasing plant conversation was held by the members present. Although there was a very small attendance due to the rainy weather every person present gained much information on the subject. The meeting then adjourned.

M. G.

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## MARCH MEETING

The regular monthly meeting of the Floral Association was held at the home of Mr. and Mrs. Jarvis Doyle 3427 Fourth St. on Tuesday evening, March 21 with an average attendance. In the absence of Mr. Gorton, Mrs. Greer, Vice President presided, no business was transacted except a short discussion as to time for holding the annual Spring Rose Show. No decision was made as to a positive time, tho the last week in April was spoken of as probably the most favorable time. The question of the bulb show being held the first Tuesday afternoon in April was also put aside for later discussion. The subject of the evening "patio planting", was introduced by Miss Sessions the speaker of the evening. Miss Sessions spoke of the patio being a very important adjunct to a San Diego home where life in the open is such a desirable feature, also as to the proper planting, being preferably in flats and boxes, also that hanging baskets could be made quite a feature, quite a few specimens of flowers and plants were brought by different members,—Mrs. Greer bringing two native shrubs, the fuchsia flowered gooseberry and a white ceanothus "wild lilac". After a very informal talk, and explanations as regards the habits of the various specimens was given by Miss Sessions, the meeting adjourned with a vote of thanks to Mr. and Mrs. Doyle for the use of their home.

MARY A. MATTHEWS,  
Secretary.

Patronize the Garden Advertisers.



# Garden Slugs Will Now Be Busy

BY BRONTE A. REYNOLDS

EDITOR STATE DEPARTMENT OF AGRICULTURE

Gardeners, mushroom growers, and truckers frequently observe irregular holes in the foliage of such crops as lettuce, tomato, peas and beans, either grown under glass or in the open, and mushrooms from which holes have been cut as by a mouse or rat, and many inquiries concerning such damage are received by the California Department of Agriculture. By close observation a glistening whitish substance will be seen on the plants or near by, and search under stones, old boards, and rubbish will disclose the cause of the injury—the garden slug.

Attack is most severe on delicate seedlings, but various tubers and roots are subject to injury; Potatoes are bored into and celery is frequently damaged during the bleaching process.

Garden slugs are not insects, although their injury is similar and they are sometimes called insects. They are mollusks and therefore related to the snails, although they have no external shell.

An extremely distressing feature of damage is that occasioned to young seedling plants set out in the flower garden, and often the amateur gardener is at loss where to place the blame when he discovers that the small plants have been defoliated over night.

This is the work of the garden slugs that have overwintered in drains and cellars or under the cement walks, and now as the weather moderates crawl forth after dark, to feast upon the garden greenery.

## Control in Gardens

Arsenic and other poisons are not especially favored in slug control, but lime and salt may be used in moderation.

To protect young plants make a ring of salt or lime around the tender plants.

When the slug touches these substances it will wriggle into the material. This causes it to secrete slime copiously and soon it exhausts itself and dies.

In the greenhouse slugs are more difficult to control, because there is a wider range for their activities and their hiding places are more numerous and not readily located. Young seedling beds should be protected by a border of such substances as salt or lime. In the case of potted plants each pot should be taken out and examined before the border of repellant is placed around it, as such pots are among the favorite haunts of the young slugs.

## Treatment in the Field

When abundant in the field or garden the slug is even more difficult to control than in the mushroom house or greenhouse, and the only solution of the problem consists in thoroughly cleaning up the hiding-places of the pest, around the edges of the garden, under

old boards and stones, and in any place that is cool and moist. These places should then be sprinkled with lime and where practicable lime should be applied directly to the area and plants on which the slugs are feeding. In time this will drive them away.

## COOPERATIVE EFFORT TO FIGHT BARK BEETLE IN KLAMATH AREA

A working agreement between various Federal, State, and private interests for fighting the bark beetle which threatens destruction to valuable pine timber in the Klamath area of southern Oregon and northern California has been reached and intensive work will begin when spring opens. All parties have been greatly aroused over the fact that a dangerous infestation of the western pine beetle has prevailed in that region since 1917. The work will give a demonstration of what can be done by co-operation on a large scale in fighting insect attacks on valuable timber of the country.

All forest interests in the region are concerned in the project, including forestry officials of the State of Oregon, private owners, the Office of Indian Affairs of the Department of the Interior, and the Forest Service and the Bureau of Entomology of the United States Department of Agriculture. Congress has appropriated \$150,000 for the undertaking, to be expended at the discretion of the Secretary of Agriculture. Forest entomologists of the department have made a preliminary survey and recommendations and will mark the trees that are to be treated. The efforts of all the co-operators will be guided by the advice of the department, represented by J. M. Miller, assistant forest entomologist, of the Bureau of Entomology.

Not all infested trees, it is pointed out, will be condemned. About 60 per cent will be felled and barked and the bark burned, as it has been found that parasites and other destructive elements will be able to hold the remaining beetles in check when part of the infested and dying trees are treated. The trees to be selected for cutting are in most instances located so that they can be readily got at and their marketability for timber will not be affected.

This "Southern Oregon-Northern California Co-operative Insect Control project" is the largest demonstration ever undertaken. It is intended to demonstrate how an undertaking of this kind, started at the right time and conducted in the right way, will prevent losses of valuable standing timber comparable with the great losses caused by a forest conflagration.

# NEMATODE ROOT KNOT

By G. R. Gorton, Horticultural Commissioner.

Probably the pest which should cause most concern to the growers of California at this time is a root nematode (*Heterodera radicola*) a microscopic insect causing a diseased condition of the root of its host known as root knot. In the mind of the layman, and even among many experienced growers, considerable confusion exists regarding its life history, habits, the means of identification, host plants, etc. The injury wrought by this pest is mistaken for crown gall,—a bacterial disease, and for nitrogenous nodules, (filled with beneficial bacteria) and visa versa. It is estimated that there are something like five hundred hosts of this pest, including most truck crops, many fruit trees, and the types of soil which are most preferred by it are those best suited to the growing of the most profitable crops, and many of the best ornamental subjects.

Partly because of the fact that the seriousness of the nematode as an economic pest has not been fully appreciated until comparatively recent years, and because of the insidious nature of the pest, the spread has increased until it is today actually in the position of menacing many of the most important phases of horticulture.

Nematodes may occur on virgin soil, on a number of native plants,—notably the mallows, or may be introduced on the roots of nursery stock, by planting infested potatoes; (this, by the way, is probably the most prolific source of spread),—by applications of infested manure; especially from live stock to which infested vegetables such as carrots, etc., have been fed; by the use of the compost heap—which is economically a good idea, but entomologically a very bad one) if garbage is allowed to form a part of the compost; and occasionally by irrigation waters from an adjoining infestation.

Artificial control measures, such as the application of chemicals to the soil or direct treatment of infested roots are not effective, except in a very limited way, and as in many other plant pests, prevention is of prime importance.

Clean soil may be kept free from this pest unless it is artificially introduced, as the natural spread is so slow as to be negligible. Where the soil is known to be infested it is absolutely necessary to grow only non-host plants or none whatever on the plot for a period of from three to five years. This in the case of a plot where annual crops or ornamentals are grown is comparatively simple, but where it is discovered that established trees or shrubs are infested the problem becomes more complex. Where the trees or shrubs are too valuable to be torn out, they may sometimes be made more resistant to the

attacks of the nematode by inducing a prolific root growth below the first fourteen inches of soil, as this is the level at which these pests usually work. The use of chemical fertilizers high in potash content is usually considered desirable for this purpose, as the potash has also a partially repellent effect.

As has been intimated, the nematode injury is sometimes confused with other plant conditions. The beneficial nodules which occur on leguminous plants form a case in point. However, as these nodules are usually symmetrical in form, whereas the nematode injury is not, and the beneficial nodule is appended to the root by a tiny filament-like structure whereas the nematode root knot is a swelling of the root itself, the differentiation is not difficult if these points are observed.

Crown gall, caused by a bacterial organism is as truly a disease in plants as is small pox to the human body, and causes a black or dark-colored excrescence of a punky consistency at the ground line on the trunk of the tree, or less often on the root. The aerial galls which occur commonly on the branches of quince trees are also caused by the crown gall organism. Nematode injury never occurs above the ground line, and crown gall injury seldom very far under the surface of the soil.

In potatoes the injury causes the tuber to assume a wavy appearance, and the potato is not scabby in appearance unless the potato scab organism is also present. In the case of most other hosts the fibrous roots are most commonly attacked.

The following is a very partial and incomplete list of certain susceptible and immune and partially immune plants.

Plants most severely attacked: Artichoke, Jerusalem; Bean, soy; Bean, lima; Bean, snap; Beet, Cantaloupe, Carrot, Lettuce, Okra, Egg Plant, Clover, bur; Clover, crimson; Celery, Cucumber, Cowpeas (most varieties except Iron, Braham and Monetta), Kale, Pepper, Bell; Potato, Salsify, Tomato, Tobacco, Watermelon.

Plants less severely attacked, and host plants: Alfalfa, some varieties; Asparagus, Cabbage, Chicory, Clover, sweet; Collard, Sugar, cane; Cotton, Onion, Peas, garden; Pepper, Chili; Potato, sweet; Radish, Spinach, Strawberry, Vetch, hairy; Vetch, common.

Plants largely or entirely immune: Alfalfa, Hairy Peruvian; Barley, Broom Corn Millet, Soy Bean, Laredo variety; Haberlandt, variety some degree; Chuffas, Corn, Cowpeas, Iron; Cowpeas, Brabham; Cowpeas, Monetta; Crabgrass, Beggarweed, Florida; Kafir, Grass, crab; Grasses, about all; Millets, about all; Oats, winter; Oats, Red Top; Peanut, Rye, Sorghum, Timothy, Wheat.



Fruit trees and shrubs susceptible to nematode: Peach, Fig, Persimmon, Pecan, Walnut, Persian; Apple, Plum, Apricot, Cherry, Guava, Pomegranates, Mulberry, Strawberry, Quince, Raspberry, Old World grape vine, Almond.

Ornamentals susceptible to nematode: Begonia, Aster, Cineraria, Clematis, Coleus, Carnation, Primrose, Cosmos, Chrysanthemum, California Privet, Dahlia, Gladiolus, Golden-seal, Spiraea, Geranium, Hibiscus, Acacia, Umbrella Tree, Wisteria, Violet, Catalpa.

The sale or other movement of trees or plants, vegetables or other similar commodities infested with nematode, is a violation of law. Such violations are being prosecuted, as part of the effort expended to prevent the spread of this pest, there are hundreds of acres of choice land in San Diego County, which is as yet apparently uninfested. The Horticultural Commission invites the co-operation of growers and others interested to assist in reasonable measures for the control of nematode root knot.

### SEEDS FROM THE ANCIENTS

BY MRS. F. T. SCRIPPS

Two thousand years ago an Egyptian was buried and in his hand he held the seed of an Egyptian pea now extinct. But the life of this pea had not reached full development for a few years ago the Egyptian Archaeological Society in their search for relics unearthed the mummy and taking the seed they carefully planted it.

Two of its grandchildren were sent to Miss E. B. Scripps of La Jolla; One of them planted in her garden—showing its appreciation of California sunshine and the beauty of life it expresses itself in a wonderful manner producing two hundred and fifty perfect seeds which many of our Floral Association Friends are going to enjoy watching their development.

It truly belongs to California for the flower is of a heavenly blue and looks as if a bit of our sky had fallen on the slender stem of delicate green and the pink of our sunset had touched the under petals.

I hope there will be enough seed next year so that all flower lovers may have some. It seems that anything so full of vitality and endurance should have a chance to express life to its utmost.

I remember last summer Miss Scripps entertained some of the sick boys from Camp Kearney, they were so delighted with the green lawns and abundances of flowers—when they came to the pea the story was told of its discovery and how it had grown. One of the boys whom we had been told had only a few weeks or a month at most to live straightened up and said, "Well if a mummy pea can have such life in its little make-up there is a chance for me": Such is the lesson of the flower if we will only see.

### GIANT TREE FALLS

Another of the venerable monarchs among the big trees in the Calaveras world-famous grove of arbor giants has been laid low.

Edgar Whiteside, who was recently returned from a trip to the grove, reports the winds of the winter have humbled Lafayette, the tallest giant in the grove.

"The Lafayette stood near the Father of the Forest and was estimated to be over 300 feet in height," said Whiteside. "The Father of the Forest is already down. Its trunk measured 450 feet from root to tip. That was the tallest sequoia of which we have any record," he said.

"The Lafayette measured 30 feet in diameter at its base. We don't know when it went down, but think it must have fallen during the middle of February. Frank McCasin, who works for the forest service in summer and as keeper of the hotel in winter, said he was startled one night in February by what he believed to be an earthquake. However, he heard nothing in reports of an earthquake. The shock that shook the hotel building must have been caused by the falling giant."—San Diego Sun.

### WATERMELONS AND SEEDS USED FOR MANY PURPOSES

In its studies of the control of watermelon diseases the United States Department of Agriculture has found that there are numerous uses for watermelons outside of their consumption as a popular fruit. Housewives have long been familiar with pickles and preserves made from watermelon rind. In China and other oriental countries watermelon seed is used as a table delicacy. Seedsmen in this country not only ship seed for this purpose, but also find a market for their product in the Chinese districts of New York and San Francisco. This liking for the seed is evidently not restricted to the Orient, for some years ago a well-known explorer reported an African tribe that sharpened the teeth in order to better strip the hulls from watermelon seeds. Within recent years a firm in Alabama has undertaken to manufacture vinegar from the juice, and from Russia come reports that during the past few years of hardship concentrated watermelon juice has been used in place of sugar to sweeten coffee.

The production of watermelon seed is an industry by itself. In a single county in Florida approximately 7,000 acres of watermelons are grown annually for seed purposes. This one section supplies a great proportion of the watermelon seed planted in the United States, and on occasion also ships to foreign planters. In recent years shipments of seed for planting have been made to Tarsus, Asia Minor, to China, and other far-distant points.

During past years profits in our southern

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## OAK ROOT FUNGUS

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the diseased material on the inner side of themselves be attacked. Various experiments have been made in placing barriers of building paper or roofing paper, boards or concrete in the ditch before refilling. These experiments are still under observation. The lighter types of building paper have been found to be worthless for this purpose since plant roots pass through them readily. No recommendation as yet can be positively made concerning the use of barriers.

One matter which should be borne clearly in mind with regard to the ditch, is that after being filled it will not be possible to reopen the same ditch again unless an accurate record has been made of its position. By measuring the distance along selected lines from adjacent trees to the center of the ditch and making a careful map for record, the ditch can be reopened. Accordingly the map becomes an essential part of the ditch operations and without it the ditch is worthless. The Division of Plant Pathology, University of California, will be glad to give such assistance as it can to persons who desire to map out armillaria spots.

It is highly desirable that diseased areas should be cultivated separately from the rest of the orchard since the fungus is probably spread through pieces of diseased roots which are carried along by the cultivating instruments and dropped near healthy trees. In small areas this may be very inconvenient and it will probably be possible to take precautions which will be adequate by making sure that no root pieces are clinging to the implement on passing the edge of the spot.

**Soil disinfectants.** Carbon disulfide has been recommended for killing the fungus in the soil. Under proper conditions it is capable of destroying the fungus; however, we have not yet succeeded in establishing the precise method of procedure. In wet ground, especially in heavy soils, the carbon bisulfide escapes before the diseased roots are all penetrated and the fungus entirely killed. For use in parks or park spaces where the cost is not prohibitive it is probably a very promising material for destroying the fungus, but it should be used probably in dry soil, the surface of which could be covered in some way or soaked with water. Experiments with other soil disinfectants are under way.

Orchards subject to occasional overflow offer a peculiar problem. Here infection may apparently come from detached pieces of infected root deposited and buried. Single trees are attacked at random. Apparently the procedure will be to remove roots of affected trees as thoroughly as possible, making a large hole, and to refill later with soil that has been thoroughly dried out. It would be wise also to regard the areas as an incipient spot and surround it with a ditch. By careful study of the situation much labor may be saved and the fungus prevented from spreading.

## UTILIZING INFESTED AREAS

Resistant trees, such as French pears and probably figs or black walnuts, may be planted where desired but even with these large holes should be dug and soil free from infection used for planting. An ideal arrangement would be to sow down the Armillaria spot to alfalfa, where that is desirable, or the spot might be cultivated as a vegetable garden. In some places the Armillaria spots have been cleared off, taking some trees around the edges, and utilized for drying grounds. Spots infected with Armillaria should not be used for growing nursery stock owing to the chance of establishing the disease in land not now affected. The most critical inspection might overlook incipient infections.

Some plantings which have been made in affected areas where large holes have been dug seem to indicate that even susceptible plants may escape if the holes are made large enough and affected roots properly removed. The infected soil should be spread out evenly and all roots gathered up and burned. If this can be done in the summer so that the removed soil becomes thoroughly dry, the fragments of affected roots which might be overlooked will have the fungus safely disposed of by thorough drying. Only surface soil or that surely free from the fungus should be used for planting. Special circumstances will arise in connection with controlling this trouble, owing to the wide variety of plants attacked, and the Division of Plant Pathology will be glad to give further advice or suggestions. Specimens of new or rare plants with this disease are desired, as well as observations of practical men, since such assistance is of the greatest help in studies of this pest.

College of Agriculture, University of California, Berkeley, California.

## MANGROVE SEEDS

The mangrove tree, specimens of which are in the Arnold Arboretum, the tree museum of Harvard university, has a very interesting method of sending its seeds or fruits into the world.

Growing, as it usually does, in shallow water, it is necessary for the young fruits actually to begin growing before they leave the parent plant. The fruit, which resembles a large inverted berry, sends out large leaves at its upper end and a long root, sometimes 18 inches in length, from the lower end, while yet attached to the parent plant.

Then, as if by magic, the parent plant drops it into the mud, where the plant already growing begins to develop it into a larger plant and soon is firmly established. It it were not prepared immediately to begin to grow in the mud it would probably be washed away.

A single mangrove is oftentimes able to start a small island by its manifold roots and arms.  
—New York World.



## BOYS' AND GIRLS' PAGE



### Letters From School Children

(Furnished by Department of Agriculture, San Diego Schools)

#### MY GARDEN

First I dug up the soil. Then I put some fertilizer on it and mixed it up to very fine soil. Then I made rows about fourteen inches apart. When I dug my soil up I found lots of roots from weeds or vegetables. For the turnips I had rich soil. I planted turnips, peas, lettuce, onions and radishes. I hope my vegetables will come up soon so I can sell it and make some pocket money.

The first thing in the morning I get up and water my garden so the sun won't scorch it. In the evening I water it too. I take pleasure in watering my garden. Every afternoon I look and see if any sprouts are up. When I am a man I am going to try and get enough money to buy a farm. If I get enough money to buy a farm I will plant all kinds of vegetables and fruit. I will try and make new discoveries like Luther Burbank did.

Joe Kirshbaum, 5-B Grade,  
Florence School.

#### MY GARDEN

First I dug up the soil then I took the lumps out of it themn I fertilized it. Then I took the hoe and made my rows and planted my seed.

I planted lettuce, radishes and onions. I planted these because they are what I like the best of anything that I have room for. I hope that they will come up so I can eat them.

I enjoy planting them because then I will know something about them when I get big.

The enemies of my garden are cutworms. The friends of my garden are bacteria.

Robert Hamilton, 5-B Grade,  
Florence School.

#### MY GARDEN

I have a garden, and I am going to tell you about it. First I prepared the soil, and put some fertilizer in the soil. Then I made a path across my garden so I wouldn't have to walk on the plants. While I was digging in my garden I came to some clover weed, I pulled it up and there were many many houses of bacteria on the clover weeds roots. Then I planted my garden. In my garden I planted beets, radishes, lettuce, onions and peas. My vegetables are beginning to come up.

Josephine Francis, 5-B Grade,  
Florence School.

#### MY GARDEN

Before I do anything I get my tools. I get my spade first, dig it well and deep and then when I have dug pretty big garden I get the rake and rake it good so to break all the lumps. The next thing I do is to water it and prepare it for good soil. Then I get the fertilizer good and thick and dig it in. Then I am ready to plant the seeds.

Before I put the peas in, I put them in water and soak them for ten or fifteen minutes, to prepare soil for peas you can have sandy soil and clay soil but I put my peas in clay soil. I dug a ditch about three or four inches deep and put my onions in, then I dug another ditch and put some lettuce in. Then I kept digging ditches and putting seed in. The ground is good and wet now. Today my plants are about two inches high.

Leslie Cartledge, 5-B Grade,  
Florence School.

#### MY WONDERFUL GARDEN

About two weeks before Christmas I decided to make a garden. It was to be a wonderful garden. My mother and father did not want me to make it, but I being determined would not listen to them.

I went and bought some fertilizer and I made that garden look fine. I was about to put the seed in the ground one day and what do you think happened? The rain started to come down in torrents so I took all the tools, put them in the garage and went in the house.

About one week after the terrible rain came. I went out to look at my garden and, alas, it had ruts in it about six inches deep and it was really adobe mud.

So since then I have never had any desire to make a garden.

Maurice Meyer, Grade 5-A,  
Florence School.

#### MY GARDEN

I have a garden. It is just coming up. I planted two rows of radishes and one row of onions. The little green leaves are showing their heads. They want to see the bright sunshine. The have never seen the sun but they have heard the other plants talk about how beautiful it is, and how nice and warm it is. They can hardly wait to see it.

Every morning I go out and water it, and every day they grow higher and higher.

When they grow to be large plants I am going to sell them and save up the money and then I will buy some seeds for next year and have a nicer garden.

Mary Nadham,  
Florence School.



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G. R. Gorton, Editor  
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### HEARING ON PINE BLISTER RUST DISCOVERED IN NORTHWEST

Washington, D. C., December 1.—To protect the white-pine forests of the West against the blister rust, a destructive disease of these trees, the Federal Horticultural Board, United States Department of Agriculture, will hold a public hearing here January 23, 1922, to consider the advisability of extending the present Federal quarantine to include the State of Washington. Any person interested in the proposed action may appear and be heard either in person or by attorney.

The white-pine blister rust was recently found on planted white pine at Vancouver, British Columbia, and on cultivated black currants at several other points in that vicinity. It has apparently extended its range from British Columbia into the northwestern corner of Washington, as it has been found at Sumas City and Mount Vernon. The disease was brought to America during the last 20 years, and has already done much damage. The white-pine forests of the Northeastern States are generally infected, and the disease is spreading in Wisconsin and Minnesota.

The rust passes one stage of its life on five-needle pines (white pine) and another stage on the leaves of currant or gooseberry bushes. Cultivated black currants are especially susceptible to the blister rust, and usually are the first to become diseased, but all kinds of currants are affected. In most sections wild currants and gooseberries are present in great numbers in association with five-needle pines, and as they become infected with the disease transmit it to white pines near by.

Prior to the discovery of the disease in British Columbia and in Washington, the blister-rust had been found only in the eastern United States and in the eastern provinces

## Floral Association Meetings

The meetings are held on the third Tuesday evening of each month. Watch daily papers for detailed announcement.

of Canada. The western pine forests in the United States that are endangered are valued at more than \$228,000,000, and are estimated to contain over fifty-seven billion feet of lumber. Much of this timber is located in the National Forests. Local control measures have been developed by the United States Department of Agriculture in co-operation with the Northeastern and Lake States which have been practicable under eastern conditions.

Official notice of the hearing is as follows:

The Secretary of Agriculture has information that the white pine blister rust (*Cronartium ribicola*) a dangerous plant disease not heretofore widely prevalent or distributed within and throughout the United States, exists at Sumas City, Mount Vernon, and possibly other points, in the State of Washington.

It appears necessary, therefore, to consider the advisability of extending the Federal domestic quarantine now in effect on account of this disease to the State of Washington, in accordance with the Plant Quarantine Act of August 20, 1912 (37 Stat., 315), as amended by the Act of Congress approved March 4, 1917 (39 Stat., 1134, 1165), prohibiting the movement from that State into other States and Territories, of all five-leaved pines, currant and gooseberry plants.

Notice is, therefore, hereby given that a public hearing will be held at the United States Department of Agriculture, Washington D. C., Room 11, Federal Horticultural Board, at 10 a. m., January 23, 1922, in order that any person interested in the proposed quarantine may appear and be heard, either in person or by attorney.

### WATERMELON SEEDS

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watermelon industry have been severely cut, due to the effect of several destructive diseases. Anthracnose, a fungous disease of the foliage and fruit, means reduced yield and pock-marked melons that rot in the field and in the freight car. Stem-end rot is a trouble that occurs in transit only, and originates with infection of the melon by the casual organism at the cut stem. Anthracnose is controlled by spraying the vines; stem-end rot by the practice of field sanitation and stem treatment. Plans are being made by the Department of Agriculture to assist growers, distributors and carriers in the proper application of disease-control measures during the coming season.

—BUY W. S. S.—



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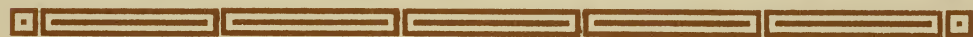
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